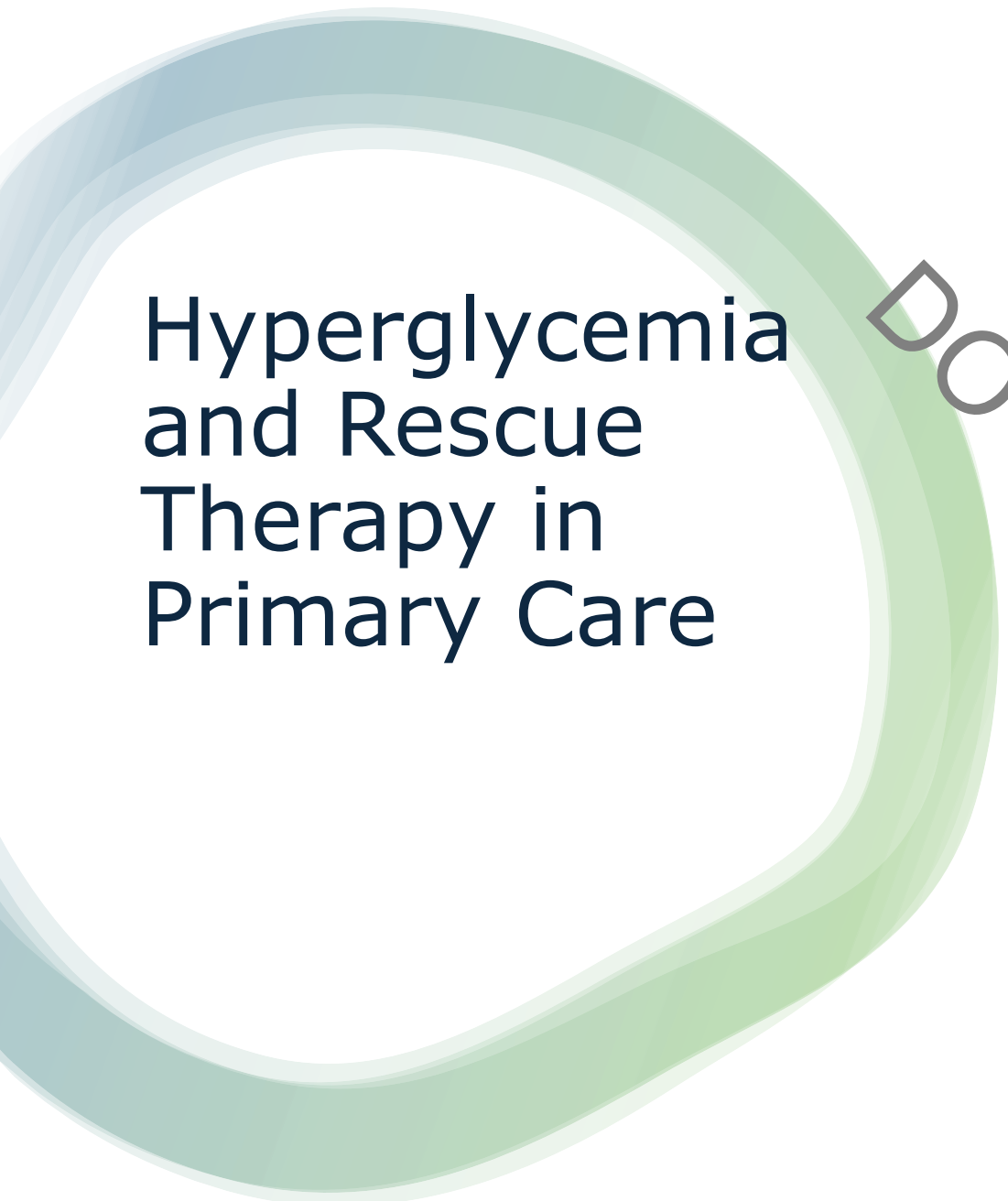




Hyperglycemia and Rescue Therapy in Primary Care

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Primary care

Learning objectives

- When rescue therapy is required
- Avoiding hyperglycaemia emergencies.
- Safely initiation: Sulfonylureas and insulin
- Safely stopping rescue therapy.

Rescue therapy should be considered in the following situations:

Symptomatic hyperglycaemia at presentation in the absence of **hyperosmolar hyperglycaemic state (HHS)** or **diabetic ketoacidosis (DKA)**.

At any stage of diabetes, when the patient develops significant symptoms of hyperglycaemia (e.g. polyuria, polydipsia, weight loss, fatigue).

When the **type of diabetes is unclear** and there is concern that the patient may have **type 1 diabetes**, pending further assessment and investigation.

*In Primary care, the key distinction is between Symptomatic but **uncomplicated hyperglycaemia**, which may be suitable for Short term 'Rescue Therapy',*

And DKA/HHS which requires urgent hospital management

DKA - Diabetic ketoacidosis

HHS-Hyperosmolar Hyperglycaemic State

Patients develop Symptomatic hyperglycaemia

-New/undiagnosed diabetes

-Acute illness

-Steroid therapy or
chemotherapy

Medication

Natural Progression of
type 2 Diabetes

Assess Severity....

- Check capillary glucose and Blood/urine ketones.
- Symptoms?
 - Polyuria / polydipsia
 - Weight loss
 - Fatigue
 - Nausea / vomiting
 - Abdominal pain
 - Drowsiness or confusion
- Vial signs and hydration
- Intercurrent illness or infection?
- Medication adherence? Missed medication/insulin
- Current diabetes medication (particularly SGLT-2)
- Steroids?
- Type 1 diabetes/LADA/ Pancreatogenic diabetes possible?



Below 0.6 mmol/L

Normal reading. No action required.



Between 0.6 and 1.5 mmol/L

Slightly increased risk of DKA.**

Test again in a few hours.



Between 1.6 and 2.9 mmol/L

Increased risk of DKA. Contact your diabetes team or GP as soon as possible.



3 mmol/L or higher

Very high risk of DKA.

Seek medical help immediately.



*Source: Diabetic ketoacidosis (2017, April). Retrieved from:
<https://www.nhs.uk/conditions/diabetic-ketoacidosis/>

**Diabetic ketoacidosis

Uncomplicated hyperglycaemia

- Well
- No significant ketosis
- No dehydration
- No acidosis

Concern

- Significant symptoms
- Dehydration
- Rising ketones
- Intercurrent illness

● Possible DKA / HHS

- Vomiting
- Abdominal pain
- Significant ketosis
- Acidosis
- Altered consciousness
- Severe dehydration

→ **Urgent hospital assessment**



Recognise DKA/HHS

- **DKA** should be suspected particularly with type 1 diabetes, insulin deficiency or illness. The JBDS adult definition requires all three components:
- Diabetes or glucose **>11 mmol/L**
- Blood ketones **>3.0 mmol/L** or significant ketonuria
- Bicarbonate **<15 mmol/L and/or venous pH<7.3**

JBDS 2023

DKA is an emergency and should be managed in hospital rather than with primary-care "Rescue" insulin

Type 2 , on SGLT-2 – risk of DKA (may have a normal BG)

HHS is usually seen with type 2 diabetes and is characterised by severe dehydration
glucose usually ≥ 30 mmol/L
and osmolality ≥ 320 mOsm/kg,
with little/no significant ketosis or acidosis.
It is also a medical emergency and should be managed in Hospital.

A useful calculated osmolality $2 \times \text{Na} + \text{glucose} + \text{urea}$ (mmol/L).

* calculate with caution in a patient with CKD.

JBDS 2022

When is “rescue therapy” appropriate?

NICE, refers to '**Rescue Therapy**' as either Insulin based treatment and or Sulfonylurea therapy, for treatment of Symptomatic hyperglycaemia but **without DKA /HHS**

The primary aim of **Rescue therapy** is to alleviate symptoms and to ensure safety if the diabetes diagnosis is unclear.

NICE recommends, reviewing/de-escalating treatment once glycaemic control has been achieved.

(NICE 2022)



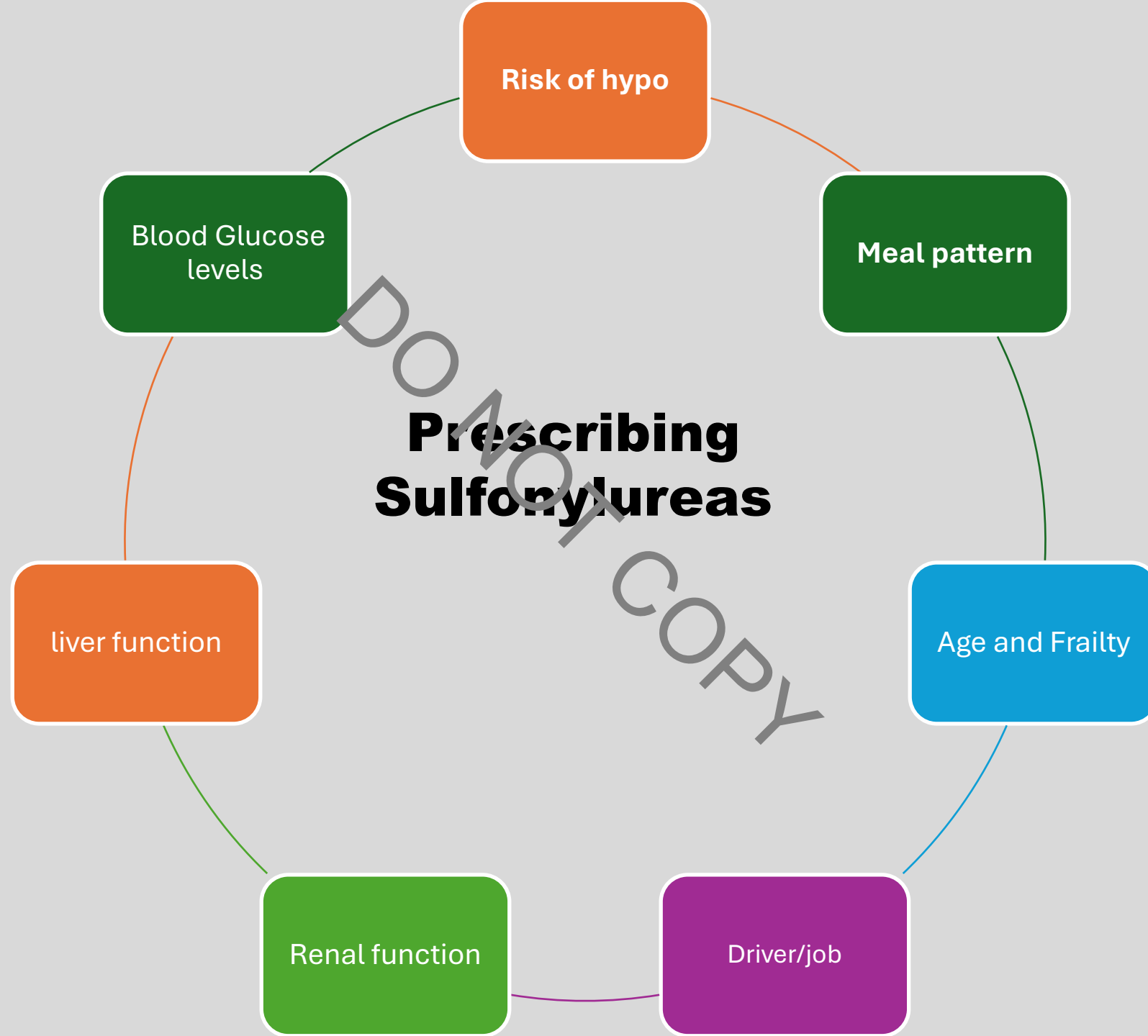
Sulfonylureas

Sulfonylureas are the first line treatment as 'rescue therapy' in patients with symptomatic Hyperglycaemia (NICE).

Also, first line in steroid induced diabetes.

Sulfonylureas (SU)

- Act directly on the beta-cells of the islets of Langerhans to stimulate insulin secretion.
- Vary in their pharmacokinetic properties, so consider duration of action when deciding on treatment
- Glucose lowering effect is immediate, provided there are functioning beta cells.



Starting doses

The starting dose of gliclazide is usually 80 mg with a meal. However, consider starting with 40 mg if there are any particular concerns about hypoglycaemia.

Encourage self-monitoring of blood glucose (SMBG) at different times of day to gather baseline information, including fasting, pre-meal, 2 hours post-meals and bedtime readings over 7–14 days, and review results. A BG profile will help identify whether to initiate a dose with breakfast and/or the evening meal.

If given with breakfast, it will potentially lower BG levels up to the evening meal.

If given with evening meal, it will lower BG levels pre-bed and during night.

Encourage person to continue SMBG before and 2 hours after meals. Review BG readings after 1–2 weeks. **(Remember, HbA_{1c} will not reveal daily variability of glucose levels or identify hypoglycaemia, and should not be used to assess response to an SU)**

When to consider insulin

Consider insulin when there is:

- Marked or symptomatic hyperglycaemia
- Significant weight loss
- Inadequate response to existing therapy
- Possible insulin deficiency
- Very high HbA1c

NICE: consider insulin-based treatment when HbA1c is particularly high ≥ 86 mmol/mol

Before starting:

- Review current medication
- Consider precipitating factors
- Education
- Glucose monitoring
- Family support

Initiation of a basal insulin regimen²

Start at **10 units/day**
or
use a weight-based calculation
of **0.1–0.2 units/kg/day**

Titrate dose once or twice weekly by **10–15%** or **2–4 units/day**
until fasting plasma glucose (FPG) target is reached.

Set an FPG target that correlates with the
person's individualised HbA_{1c} target

If **hypoglycaemia** occurs and there is no clear reason or cause,
reduce dose by **10–20%** or **4 units/day** (whichever is greater)

Blood Glucose monitoring

- Critical for evaluating the treatment effectiveness,
- Adjusting medication Safely
- Prevent/ avoid Hypoglycaemia
- Important in people who drive (DVLA driving regulations).



DO NOT COPY

Review..

At least once weekly contact to assess response to the treatment and titrate doses based on glucose trends and patterns.

If there is little to no response to SU treatment and patient remains symptomatic, insulin therapy may be required.



Safely stopped Rescue therapy

In people with confirmed diagnosis of type 2 who require rescue therapy, once their symptomatic hyperglycaemia has resolved, it is advised to reassess their medication.

Switching to an alternative glucose lowering class with more favourable risk – benefit ratio.

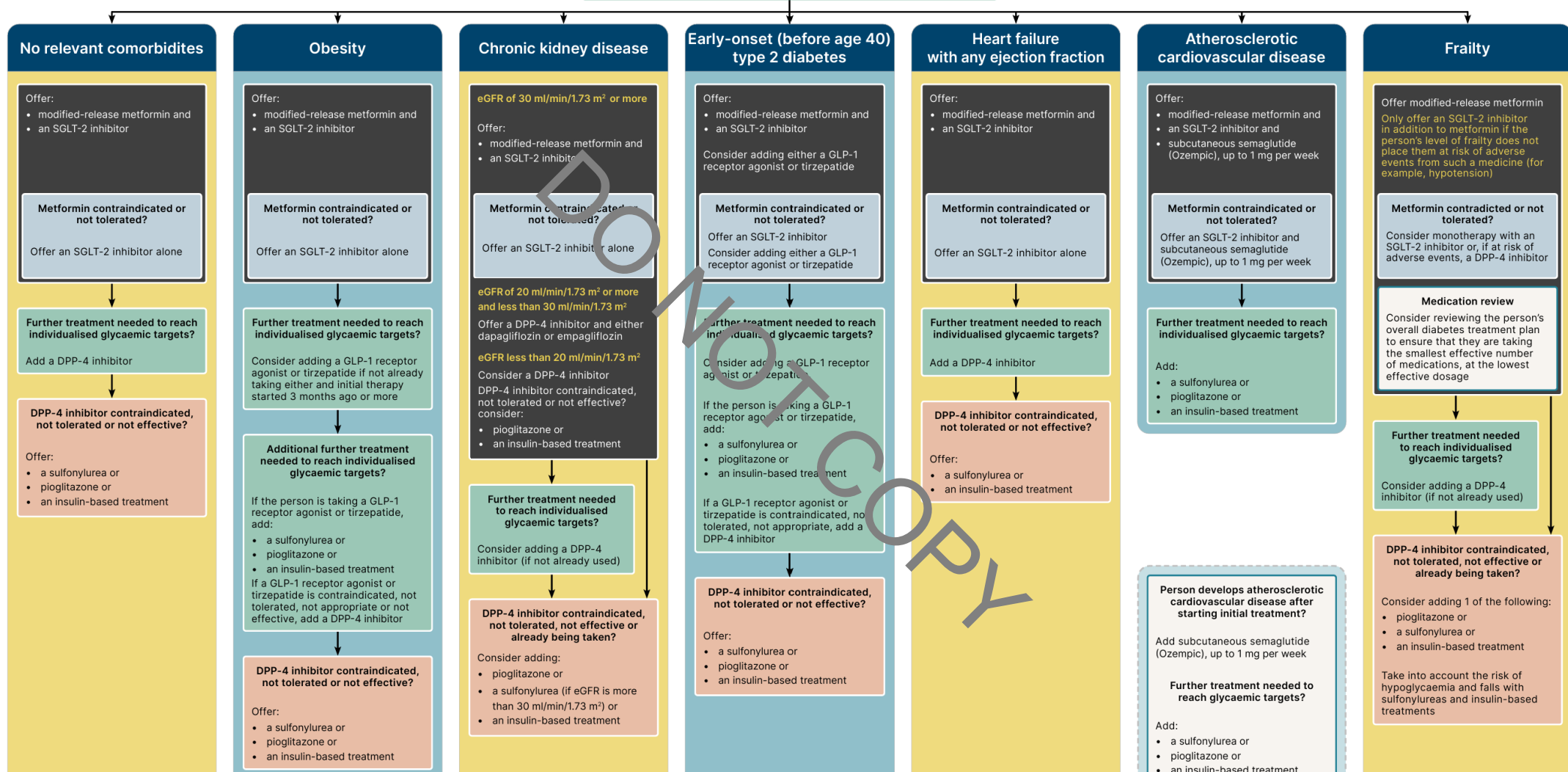
Cardiorenal benefits, weight benefit and lower risk of hypos

Continue to Monitoring of CBG – reduce testing

Hba1c should be repeated in 3months

Access to support if problems between reviews

At each stage diet and Lifestyle measures should be optimised



Case study 1.

71-year gentleman

Type 2 Diabetes

Hba1c 169mmol/mol. Previous Hba1c 116

Diabetes Medications

Metformin 1g BD

Dapagliflozin 10mgs

Gliclazide MR 80mgs BD

Urine = Glucose +++ , no ketones. nil else

U+E - Na 131, Urea 8.3, Bicarb 23, Egfr 60

Patient was brought to the clinic.

Reports feels well.

Diet - Eats sweets, cakes and chocolates to attempt to build up after cancer of Larynx.

Blood ketone 0.5

Blood glucose 21.5mmolls

Calculated Osmolality - 291.8. bicarb was 23

BP 148/63

Weight 84kgs (84.8kgs when in hospital 3months ago)

No sickness, no vomiting , no tummy pain. No weight loss. No ketosis smell of breath.

Was thirsty, mouth wasn't too dry.

Polyuria , tiredness and some thrush

Has been taking his medication as prescribed.

No infections

No steroids

NO signs of DKA or HHS

Stopped Dapagliflozin – THRUSH Risk of DKA

Increased gliclazide for that day 160mgs at the teatime instead of 80mgs

Note Hba1c 160 (NICE guidelines say ?)

Discussed insulin start – Patient wanted once a day insulin

FTF Appt next day –

Education delivered/ Glucose and Ketone monitoring

Driving regulations

Hypoglycaemia management

started Lantus 10units once a day mane (continue metformin and Su)

Advised if become unwell to go to ED. Sick day rules

Encouraged fluids (water).

Monitor CBG pre meals and pre bed.

Diet changes. Refer to dietician

GP reviewed also to assess other precipitating factors

Telephone RV twice a week- assess blood glucose levels and titrate insulin doses.
Seen FTF several times. CBG and symptoms assessed , insulin titrated.
Hba1c repeated 3months, repeat was 119mmol/mol.

Important to bring Hba1c down slowly

Recent review(6months later) CBG are ranging from 8-9mmolls. Hba1c 61mmol/mol
Lantus dose - 32units mane
No thrush, more energy, no polyuria, no thirst.
Reviewed by dietician – happy with his weight.
No other precipitating factors identified.

Reassessed his diabetes medication and treatment
– metformin, gliclazide 80mgs BD continued,
restarted the SGLT-2 (hypertension/ QRISK 18).
Will continue to assess and reduce the SU/insulin.

Case study 2.

68-year-old lady attended clinic.

Seen Gp week previous, New diagnosis of Type 2.

BMI 35

GP had started Metformin SR 500mgs at teatime.

Tolerating well. To increase to 500mgs BD for a week, then up titrate if tolerated to 2g daily.

However, when patient sat down it was obvious, she had a dry mouth when she talked.

Reported polydipsia, Polyuria. No weight loss. Tired.

Recurrent UTI.

Random CBG was 19.7mmolls.

Blood ketone was 0.1mmol/L

Diet discussed, small changes

Symptomatic hyperglycaemia - Started on Gliclazide 40 mg with breakfast

Taught Home Blood Glucose Monitoring – CBG check pre-meals and pre bed hypoglycaemia advice.

Patient does not drive

Telephone Review couple of days after.

Mouth less dry, still up to the toilet through the night.

Home glucose levels improving slightly, ranging 9.1–16.0 mmol/L. Higher pre bed, early morning.

Diet discussed – not eating at night.

Gliclazide increased to **40 mg morning / 40 mg teatime.**

Week 2

symptoms **completely resolved**

glucose levels down to 8–13mmol/L. no change to diabetes medication

Week 3

Glucose levels well-controlled at 5 –9 mmol/L.

Metformin MR 2g at teatime, tolerated with no side effects.

Stopped gliclazide as acute rescue phase concluded and glycaemic control was better.

Week 6

Capillary glucose stable at 5.8–9 mmol/L. Glucose monitoring stopped.

Commenced on Dapagliflozin 10mgs (NICE guidance)

• 3 Months Later HbA1c rechecked at 58 mmol/mol

Metformin + SGLT2 tolerated.

BMI - 34 GLP-1

Case Study 3.

29-year-old gentleman

Presented to the GP with diarrhoea, tiredness and weight loss.

Hba1c, and other bloods was sent.

No History of Diabetes

Hba1c Result was 118mmol/mol

venous BG - 18mmols.

(bicarb 25)

BMI 21.

Osmolality 287

No tummy pain, no vomiting.

Not DKA / HHS

Brought to clinic the next day , Random Blood Glucose – 12.3 mmoll. B Ketone 0.4mmolls
Diet – 6-7 energy drinks a day. Chocolate and buns daily.

Needle phobia.

Lost 1stone in 3 weeks.

Both parents have 2 type Diabetes.

Polyuria/ Polydipsia for a month

Glucose monitoring/DUO Ketone meter.

To check CBG pre meals and pre bed.

Started on Gliclazide 40mgs mane,

Hypo advice

Driving advice.

Discussed with secondary Care Consultant, Antibodies sent - ?type of diabetes.

Encouraged Fluids

Worsening advice given

Phoned the next day.

breakfast	lunch	Tea time	Bedtime
11.0 *	9,8	8.4	9.9
10.1	9.9	10.1	

Blood ketone was 0.2mmolls.

Day 5 - FTF.

CBG had improved 6-10mmolls. Less tired. Sleeping better

Patient had made lots of changes to his diet. As he did not want to go onto insulin.

Blood ketone was 0.1mmolls

2 weeks

CBG ranging from 7-10mmolls. Diarrhoea had stopped.

Patient was seen in 4 weeks from initial assessment – antibodies suggest -LADA.

Gliclazide 40mgs was continued for now, but insulin was mentioned If CBG do not remain stable.

Glucose monitoring continued. Review again in Secondary Diabetes Clinic clinic.

Case Study 4.

89-year lady left urine sample into treatment room

Urine showed glucose ++++

Urine Ketone +++

I advised patient to come back into the treatment room to have her capillary glucose checked.

Daughter reported her mother is very weak, mobility reduced, confused at times,

CBC – HI.

Blood ketone was 4mmolls

Strong smell of ketones of breath.

Was feeling sick.

Mouth was very dry. Reduced urine.

Diabetes medication – metformin 1g BD. Which she wasn't taking daily as it was making her sick.

Recent Hba1c 3months was 61mmolls.

Uncomplicated Hyperglycaemia?

In Conclusion

Rescue therapy in type 2 diabetes means **short-term use of sulfonylureas or insulin** to lower **symptomatic hyperglycaemia**, preventing **DKA/HHS**, stabilising blood glucose levels.

Safe practice requires **clear triggers for starting, structured glucose monitoring, and** appropriate review of patients.

Thank You

Any question? !?